

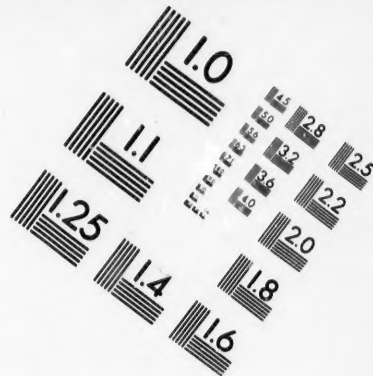
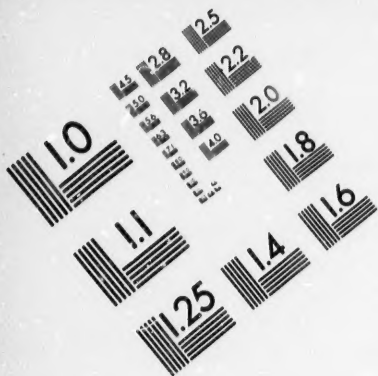
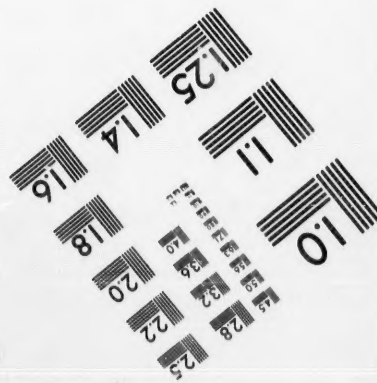
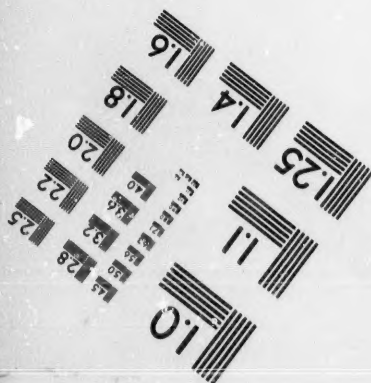
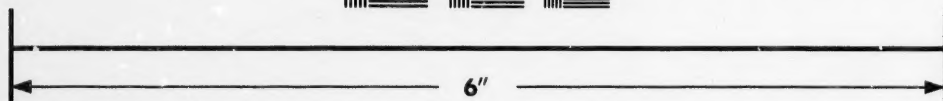
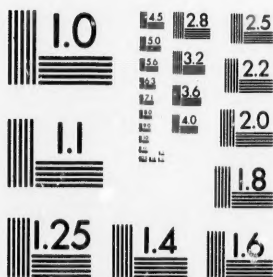


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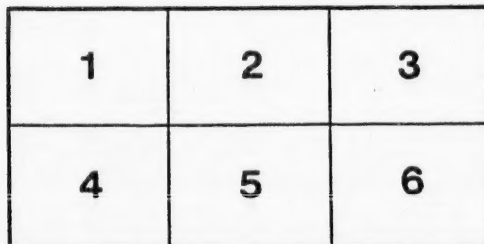
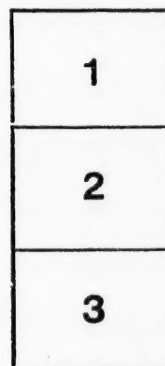
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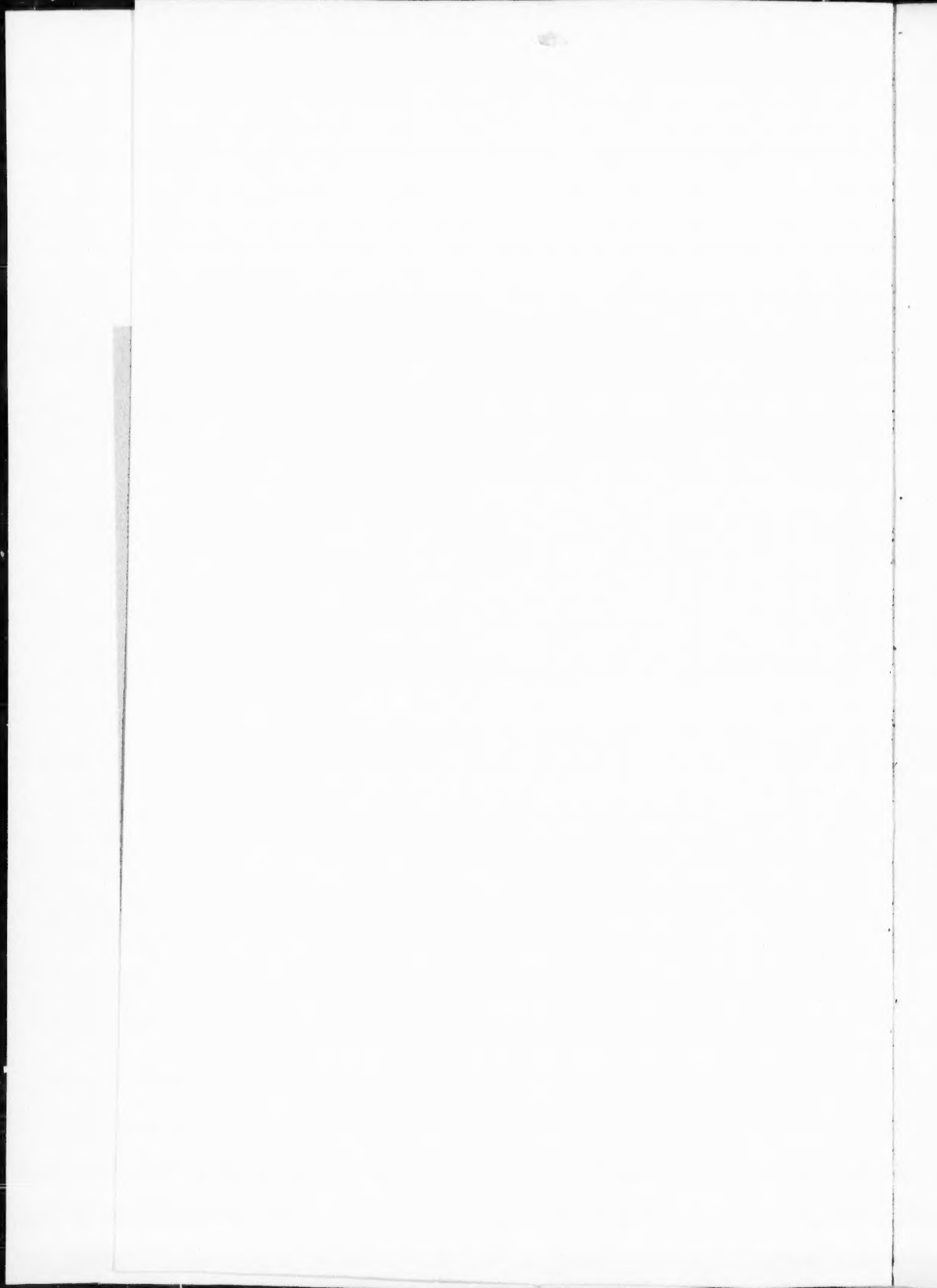
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W. J. Hart. with Author's regard

INAUGURAL DISSERTATION

ON

TIC DOULOUREUX,

WHICH,

IN ACCORDANCE WITH THE STATUTES, RULES, AND
ORDINANCES

OF THE

UNIVERSITY OF MCGILL COLLEGE

FOR THE ATTAINMENT OF THE

DEGREE OF DOCTOR IN MEDICINE AND SURGERY,

WAS DEFENDED IN PRESENCE OF THE PRINCIPAL,

G. J. MOUNTAIN, S. S. T. P.

AND THE MEDICAL FACULTY OF THE SAID UNIVERSITY.

By Frederick W. Hart,
OF THREE RIVERS, LOWER CANADA.

Quæ medicamenta non sanant, ea ferrum sanat.
Quæ ferrum non sanat, ea ignis sanat.
Quæ verò ignis non sanat, ea insanabilia existimare oportet.

HIPPOCRATES APHOR.

May 25th, 1835.

MONTREAL:

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1835.

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TO

WILLIAM ROBERTSON, M. D.

PROFESSOR OF THE

THEORY AND PRACTICE OF PHYSIC,

IN THE UNIVERSITY OF M'GILL COLLEGE,

THIS DISSERTATION IS DEDICATED,

NO LESS FOR HIS DISTINGUISHED EMINENCE AS A PHYSICIAN

THAN FOR HIS KINDNESS TOWARDS,

AND THE MANY BENEFITS DERIVED

BY HIS PUPIL

THE AUTHOR.

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IS PRESENTED AS AN OFFERING OF RESPECT

AND GRATITUDE, BY THE

AUTHOR.

**"THE HEAVIEST DEBT IS THAT OF GRATITUDE
"WHEN 'TIS NOT IN OUR POWER TO REPAY IT."**

TO BENJAMIN HART, Esquire,

OF MONTREAL.

RESPECTED AND BELOVED PARENT,

TO YOU I DEDICATE THIS

ESSAY

AS A FEEBLE RETURN FOR YOUR FOSTERING

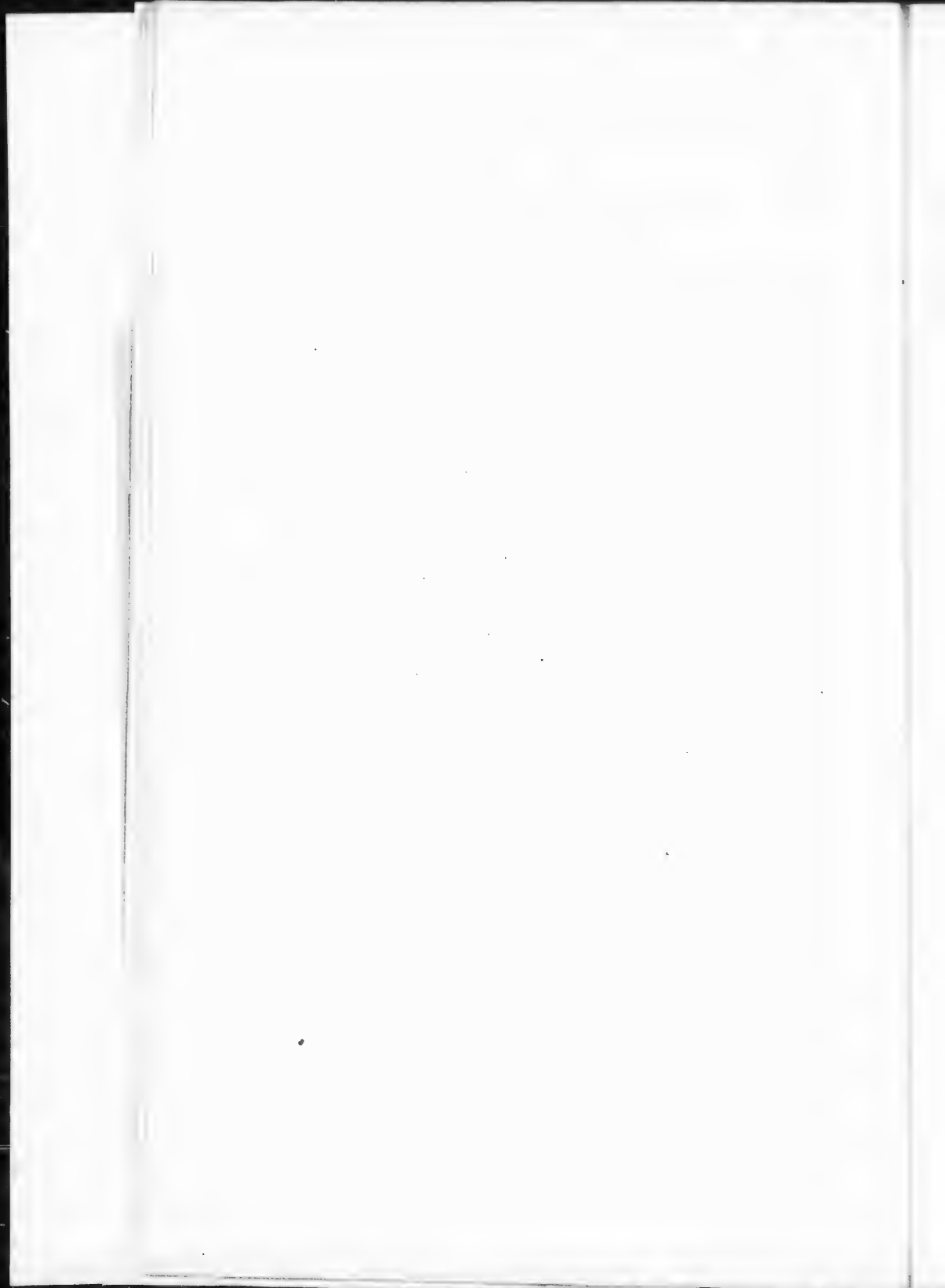
AND PATERNAL CARES,

AND THE AFFECTIONATE KINDNESS

EVER EXTENDED BY YOU

TO

THE AUTHOR.



MEDICAL INAUGURAL DISSERTATION ON NEURALGIA.

HISTORY.

IN describing the history of this disease I may remark that previous to the time of M. ANDRE, a French Surgeon of Versailles, from whom the appellation *Tic Douloureux* is traced in his treatise on diseases of the *Urethra*, published in 1756, the disease though mentioned by some was very imperfectly understood and defined by terms as difficult of comprehension.

Concerning the origin of the term *Tic* much doubt has been entertained. SAUVAGES has a species *Trismus equinus gallicè le Tic. Sic dicitur quia equi hoc affectu laborantes dentibus præsepium impetunt et sonum Tic referunt** under the eighth species, *Trismus Hypochondriacus*, he observes, *huc referri potest distortio musculorum genas oculos, &c. maxillam moventium involuntariè et pravo usu assula, quæ vulgo Tic dicitur.*

The singular affection of horses, during which they strike their teeth together while biting at the manger, and the convulsive twitching of the muscles of the face, eyes, and lower jaw, in which some persons indulge, are therefore the roots of this expression.

The term "*Tic*" was consequently applied to the disease and the epithet *Douloureux* added from the poignant pain accompanying such convulsive motion attracting as much notice as the former.

The disease has also received several appellations from different authors, in the edition of Sauvages' *Nosologia Methodica*, 1763, it is designated by the term *Trismus Dolorificus*. Dr. JOHN FOTHERGILL under the appellation of "*Dolor Crucians faciei*," seemingly unaware that André had anticipated him, pro-

* *Nosologia Methodica*, Class IV. II. I. 6.

duced an excellent treatise on the subject. It is not true, however as is generally stated that he is the original discoverer of the disease, so far from being correct that an operation for the relief of this disease performed long ago by Louis is recorded.* Posterior to the time of Fothergill many essays have appeared on this subject. By a very interesting view of this disease and its surgical treatment, the ingenious Dr. HAIGHTON has distinguished himself.† Dr. S. FOTHERGILL also produced an excellent essay on this disease under the title of "*Faciei morbus crucians*. Abolishing the unscientific language heretofore made use of, we shall adopt as the title of this disease the term *Neuralgia* from *νεῦρον* a nerve, and *αλγος* pain, so aptly denominated by Professor CHAUSSIER, and which is generally received and made use of by most authors of the present day. In the American journals, cases are on record and mentioned by Drs. HOSSACK, and JACKSON. And VALENTINE MOTT has been instrumental in relieving many cases.

According to Dr. Seibold, writers of all nations, excepting the Italians, have seen cases of *Neuralgia*. Dr. Thilenius, a German physician saw it but twice during a most extensive practice of twenty years. Dr. Aeppli, a Swiss physician saw it only once during a practice of twenty-seven years.

As to the greater liability to this disease exhibited by either sex, a difference of opinion exists; the law of nervous irritability exposes females, both in England and America to a greater degree than the hardier sex. The appearance of this disease is irregular and deceptive to the extreme: seemingly every kind of temperament, indeed no habit of body or life appears exempt from its attacks. The laborious and indolent, the phlegmatic and nervous, those of rigid as well as those of lax fibre, the robust equally with the delicate are exposed to the excruciating torments of *Neuralgic* affections.

Fortsmann, a German writer, quoted with great respect by Hertloupe, as also Dr. Darwin, concur that

* Cooper's Surg. Dic.

† Med. Records and Researches.

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the disease is most frequently met with between the twentieth and thirty-fifth year.

The disease is seldom met with among children, though some Continental writers mention cases occurring during the seventh and ninth year of age. Nor is the disease confined to one part of the body only. The following facts are enumerated by authors: The one half of the face: Fothergill and others. In both cheeks: Pujol. Both sides of the maxilla inferior at the exit of the nerve in one part: Lenten. Mr. Abernethy's remarkable case shows its existence in the ring finger extending up the arm. The whole head and face: Lenten and many others.

The subcutaneous nerves, particularly those of the face, are most liable to this affection, their superficial situation exposes them much to mechanical *lésions*, and impressions of the atmosphere.

The *Pes Anserinus* and *nervus communicans faciei*, the frontal nerve being the termination of the ophthalmic of Willis, a first branch of the trigemini, the ultimate disposition of the second branch of the fifth Infra-orbitary, and lastly the mental nerve, the third branch of that important trunk, are the sources of pain and suffering.

The tongue, tonsils radial ulnar and anterior tibial nerves have occasionally been affected with this disease. The breast, stomach, kidney, bladder, heart, &c. are enumerated by Drs. Brown and P. Teale, as affected with *Neuralgia*, being symptomatic of spinal irritation. The greater liability to disease from exposure to irritations of various kinds, leads me to conclude that the spinal marrow is not in "most cases," (as asserted by Dr. Teale,) primarily affected; but that the ganglia and plexuses from which the digestive organs derive their nerves are frequently the original seat of this affection.

The spinal marrow is so well protected and defended within its canal by its fluid, tunics, and bony encasement, that it appears less likely to be primitively affected by disease, unless by the application of direct violence than, the abdominal viscera.

The symptoms, flatulence, pyrosis, constriction are so invariably attendant on disease of the abdominal ganglia and plexuses, and from the facts that the exposure of the digestive apparatus to irritation and inflammation is so much more immediate from the complicated assimilations which it performs, being so easily deranged by direct communication with indigestible substances, and other sources of irritation, by its connection with the brain through the visceral nerve, "par excellence," from the dorsal ganglia of which those nerves take origin, whose ganglia and plexuses supply the digestive tube with nervous energy, also through the par vagum and inosculation, in consequence of which depressing passions and excitement of various kinds referred to those ganglia, (without approaching any nearer the Broussaian doctrine of perception,) and the diseased state in which these ganglia and plexuses have been discovered after death, render it more than probable that they are primarily affected, and by causing irritation and tenderness on pressure over the spinal marrow, between which and the ganglia, nerves of communication run, give evidence of their disorder. In this manner the medulla spinalis serves as an index of visceral disease which it may also complicate with symptoms of deranged function of the organs, which it supplies with nervous energy.

Among the host of diseases which present themselves to the physician there are few indeed in which the nervous system including the brain, spinal marrow and nerves are not more or less implicated next to the sanguineous blood vessels; for the free and perfect discharge of their incessant functions, require an uninterrupted flow of nervous energy. But from no evidence in physiology can it be asserted that this last is in any manner or degree communicated to the blood itself, which is the communicative source from being to being, of substance, vitality and mind, and on which the nervous system is dependant for vitality and existence. To embody a sketch of the facts and philosophy on which the foregoing comprehensive statement

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is founded, and to enter into the details of a neuropathic Bibliography, as might be expected, topics which would lead to many interesting discussions, is not my purpose; circumstances obliging me to present this essay sooner than I had anticipated, and which will prevent my enlarging on this subject as much as my intention would lead me, I shall consequently confine myself more particularly to that singular chronic painful affection of the nerves, the *Neuralgia Facialis*, to which the public attention is now so strongly directed.

Concluding my introduction and history by remarking that the nervous system from the many and ingenious hypotheses indulged in, for the purpose of explaining its functions, such as that of Vibration, Oscillation, &c. and which like many similar, with credit due to their ingenuity, though seemingly plain enough to their authors, are but partially if at all agreed to or understood by the reader; and which spring mostly from the imagination, indulged on such subjects, overshadowing reason and spreading its shade through the whole hypothesis, from the cloud diffused over the disease of this function, and which from the praiseworthy exertions of some of our physicians and surgeons is now partially clearing off (from the exertion of forces tending its removal, but hitherto overbalanced by its density which as science progresses most ultimately be removed,) as to transmit some rays which when a few pierce through from their action, dissipate their confines that more may be transmitted till the whole is evaporated.

From the late discovery by Sir C. Bell of the beautiful division of the nerves into those of sense and motion—from the control exerted by this system over the functions of the human frame, which by its extensive sympathies, when diseased produces pain, irritation and disorder in the most distant parts—also from the late discovery of diseases, *hitherto* supposed to be produced by certain causes, for want of more appropriate, or I may say produced by unknown causes, *now* found to be either symptomatic of spinal irritation, or induced by a continuance of diseased action

in that part, necessarily impairing the functions of those nerves, proceeding thence, consequently causing disease in the parts to which they are distributed.

All these intricacies noticed above and which by dint of careful experiments and observation have by degrees become more or less unravelled, excited my interest and caused my studies and observations to be particularly directed to its discoveries and applications.

CHARACTER.

This affection is characterised by Sauvages as follows :—*Est difficultas maxima et valde dolorifica os aperiendi aut movendi cum uberi ptyalismo pervigilio et musculorum vicinorum continua et convulsiva agitatione.* He defines the disease by the title "*Trismus Dolorificus.*" Dr. Mason Good, in his *Physiological Nosology*, remarks that Dr. Darwin very properly objects to the word *Trismus*, under which this genus has commonly been arranged, as no fixed spasm like that of Locked Jaw exists in this malady; Darwin also adds that in the few cases he has witnessed, there has not been any convulsion of the muscles of the face, though this may possibly occur occasionally as the consequence of a disagreeable sensation, or to relieve it—to which Good subjoins, every other writer on this disease, besides himself has noticed the existence of some kind of nervous contraction, distortion or agitation from the commencement of the disease; and in the case of Mr. Bosworth, Dr. Darwin expressly observes that during the return of the pain he seems to stretch and extend his arms, and appears to have a tendency to epileptic actions clearly evincing a spasmodic diathesis. Dr Good seems to have overlooked Sauvages' definition of *Trismus convulsio vel tonica vel clonica maxillæ inferioris* and the tremulous agitation of the jaws and lips together, with the temporary closure of the jaws are points dwelt on by many, consequently we see that Dr. Darwin's criticisms assisted by Mason Good, might well have been spared. The

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following character may be less exposed to exception than many I have met with. *Neuralgia* is marked by acute lancinating pains not confined to the course of the trunk of any particular nerve, but may affect its most minute ramifications together with distortion and convulsion of the muscles supplied by the diseased nerve. Paroxysm of short duration, occurring at irregular periods.

DESCRIPTION.

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Neuralgia has been divided into Frontal, Sub Orbital, Maxillary or Neuralgia of the lower jaw and Facial, or that of the Portio Dura; the first when the frontal nerves of Willis are affected, the second, when the superior Maxillary is the seat of the affection, the third, when the inferior Maxillary, and the fourth, when the Portio Dura is so affected. The sufferings in the first case are not complained of as confined to the upper part of the eye and forehead, but after sometime that its effects have extended over the whole surface of the eye, conjunctively and subsequently all the corresponding sides of the face and head, the Sub Orbital, Facial, Maxillary, Temporal, and even the Occipital nerves through the nervous connections of all those organs.

The paroxysm is attended with spasmodic contraction of the eyelids, as also by a flow of tears. The sub orbital like the preceding is not for any time confined to the branches escaping from the foramen of the same name, but extends likewise to its nervous connections. As to the neuralgia of the facial nerve, it is a case that spreads so rapidly as to render it impossible to distinguish it from the other species of neuralgia of the face.

Like Chorea Sancti Viti it is unattended with swelling or any other external mark of disease. Its first symptoms are occasional, irregular twitchings of the muscles supplied by the diseased nerve; in other instances acute pain shooting down to the teeth. Sometimes it begins with the violence of an electric shock,

again it is announced by the perception of an odour, an itchiness in the face, a kind of Aura Epileptica, the palpitation of the eyelids, a particular sense of tension in the palate and nose. By degrees the symptoms become developed, spasmodic actions increase in frequency and acuteness, and an embarrassing train of symptoms is noticed; the pain is irregular and fickle as to its locality and hour of accession; sometimes it rests in a circumscribed point, at others widely diffused; it has been known to leave one side of the face and attack the other, it surpasses in atrocity the most violent pains of toothache or earache; the patient is in real despair, ordinarily he can neither speak, swallow nor chew; some persons however have the lips and tongue in constant tremulous motion, accompanied by a noise resembling that caused by *manducation*, these can both chew and speak. A strong pressure in general can be better endured on the affected parts in this form of disease than a light touch; the patient's rest may be disturbed night after night as well as his comfort destroyed during the day; the most trifling and opposite occurrence gives rise to the spasms, which by their severity overcome the strongest resolution and force forth loud and involuntary screams of anguish.* Washing the face, moving the hand or a handkerchief over the face, eating, drinking, speaking or coughing, sometimes the slightest motion or exertion will excite a return of the pains, taking any thing into the mouth hot or cold will produce the effect with aggravated violence. Sometimes it commences with a throbbing which seem to begin like the vibration of a musical cord, extending its effects to the cheeks, the nose, the eye up to the scalp on the affected side or from the corner downwards to the base of the jaw, agitating the muscles of the chin. Most frequently when the paroxysm comes on the patients whole body is convulsed, from the excessive agony, the eyes are intensely closed, mouth distorted, the cheeks quiver, the whole body moves backwards and forwards, and

* Dr. Gardener Jones' own case, Phil. Med. Mus. New Series, Vol. I. No. II.

the foot of the diseased side is involuntarily moved in conformity with the flexure of the body. The face is red and swollen, sometimes livid; in other cases the blood vessels of the affected side are distended, there is little fever and the pulse is regular and slower than in health; interruption to every enjoyment and occupation of life, so admirably described by Jones' communication of his own sufferings, is only equalled by the degree of misery with which these paroxysms are attended.

In general the seizure is short in proportion as the pain is exquisite, commonly it lasts for a few minutes only, seldom for fifteen minutes, and very rarely for an hour; sometimes it subsides with a gradual, at other a sudden decrease of pain, followed occasionally by a copious flow of saliva, tears, mucous from the nostrils and eructations.

The intervals between the paroxysms are sometimes though rarely equal. The preceding delineations are applicable to a confirmed case; involving most of the facial nerves, in many instances the operations of the disease are more confined, and give rise to a deception of the diagnosis. The first case recorded by Sauvages was mistaken, and treated by him for *Odontalgia*; this mistake has been often repeated as the obstinacy of the patient points to the gums, a carious tooth or the *Antrum Highmorianum* as the seat of the disease; with this view the gum has been divided in various directions, many teeth unnecessarily extracted, and useless perforations made into the cavity of the upper jaw.

After lasting sometime, the disease if not arrested will involve every neighbouring nerve. In Mr. Bosworth's case reported by Dr. Darwin, the supra-infra, orbital, and mental nerve, as also the branches of the *pes anserinus*, and of the superior maxillary nerve passing into the cheek between the *Pterygoideus Internus* muscle and the upper part of the lower jaw, were all by the dexterous and repeated use of the knife successively divided; in consequence of which, this formidable and intricate disease was at length radically cured, and the patient perfectly restored to ease.

The constitution of the patient seldom experiences any deterioration, during the continuance of Neuralgia.

CAUSES.

The remote causes of Neuralgia are very obscure, in a plurality of cases no predisposing nor exciting causes can be detected; in some cases local injuries are the only assignable causes.

We shall proceed to investigate its dependance on the various causes enumerated: among the predisposing causes are ranked gout, piles, disease of the abdominal viscera, derangement of periodical discharges, and cancerous maladies; it is also stated that cold climates predispose to the disease. As to its chief exciting causes, injuries of the head, suddenly suppressed evacuations, natural, artificial, and morbid, sudden transition from heat to cold or long exposure to severe cold, carious teeth, and irritation in the nerves of the teeth themselves or of those parts by which they are immediately surrounded and with which they participate in action, are exciting causes of the disease.

In this variety, the exact seat of pain is very difficult to define, there being no black spot nor external mark to direct us to it, the tooth being often mistaken for the continuous sympathy excited, and sound teeth extracted in its stead; there are instances where tooth after tooth was extracted till the whole side of the affected jaw was divested, and without any alleviation: this is often an idiopathic affection dependant on a peculiar irritability, from a cause beyond our reach, of the nerves subservient to the aching tooth, the tunics by which it is covered; the periosteum or the fine membrane lining the interior of the alveoli.*

Sir Henry Hallford† stated that diseased bone was the cause of Neuralgia; in one of his cases there was an exostosis of the alveolar process, in another there was disease of the *Antrum Highmorianum*, and in the third, the most remarkable of all, there was an im-

* Mason Good's Practice of Medicine,

† Lond. Med. Gazette, vol. I. p. 605.

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mense deposit, like *frost work* or *petrefactions* on the internal surface of the skull, which must have caused great pressure on the brain. Desault found a diseased state of the bony foramen, through which a branch of the third pair affected with Neuralgia passed. Cases are on record of diseased bone and injuries having been followed by this complaint; but the difficulty of implicit reliance on such observations depends on the fact that disorders frequently exist "together" in different parts without having any kind of connection with each other, and terminate quite as independantly.

Wounds of nerves, whether produced by laceration, puncture, or by the presence of foreign bodies, may be followed by this affection: such injuries, whatever be their seat or degree are followed by intense pain, whether the nerve be perfectly or partially divided; they are not necessarily accompanied by palsy of the parts to which the nerve is distributed, but when palsy does supervene, it may be temporary or permanent.

According to circumstances the wounded parts sustain, adhesive inflammation terminating in "*Primitive Reunion*," occasionally the suppurative succeeds, and sometimes the ulcerative which becoming chronic, leads to various alterations of texture; these diversities of inflammation frequently appear to depend on the kind of Traumatic Lesion, also on accidental causes; as the influence of the atmosphere and motion of the injured part. The effects of wounds of the nerves are always modified by the constitution of the patient, and previous state of health or disease, as much or even more than those of any other kind of lesion.

Serious accidents where they do supervene, depend on the wound only as an occasional cause; in most instances if the person is in health and kept tranquil, avoiding every exposure, the wound heals readily, and without accident; as many experiments have proved. Sometimes puncture of a nerve may be followed by intense pain and even convulsions, extending to distant parts and occasionally implicating the whole system.

In the case related by Dr. Jeffray the disease was produced by a wound from a piece of china imbedded

in the substance of the cheek. Sudden irritation of the mind, also derangement of the digestive function, increased action of the blood vessels of the brain is also enumerated among the exciting causes. As to the proximate cause of this disease, many authors have agreed in assigning it to Arthritic matter. Dr. Hos-sack coincides partially with this opinion, thinking that in one case Mr. Aphorpes'* gout was intimately connected with Neuralgia.

Dr. Rush in his chapter on gout,† expresses his opinion that Neuralgia is of gouty origin; and the greater frequency of gout in the female sex, according to his ideas, is sufficient to account for their greater exposure to Neuralgia. This hypothesis is not applicable to every case, at least, as the gouty diathesis cannot be detected in most instances of Neuralgia; it may be safely pronounced inadequate to explain the mystery.

Some pathologists have given out that the proximate cause of this disease consists principally in some obscure affection of the brain; with which opinion, Dr. Gregory coincides, from the circumstance of his having known the disease to terminate once by Coma, and in another case to be followed by Amaurosis. Very extraordinary reasoning, I must allow: if the brain was principally in fault, it is very certain there would more frequently be observed indications of disturbed functions, than is generally noticed during Neuralgia; in fact, during the first stages of the disease, no instance is recorded of impaired function dependant on the attack, and rarely during the continuance; neither the pulse, tongue, stomach, nor intestinal canal indicate that the sensorium is affected. The treatment of the disease also shows the fallacy of supposing it as entirely nervous, since neither tonics nor stimulants have been followed by a more fortunate issue; and most certainly if the brain were primarily affected, some of the anti-phlogistic means would be of service.

* Amer. Med. and Philos Register, Vol. IV. No. II. page 299.

† Med. Inq. and Observations, Vol. II.

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Pathology has thrown little light on the proximate cause of this disease. Cases are on record of its having continued for upwards of twenty or thirty years, without inducing any constitutional disturbance. Some cases are on record where the disease has moved from one cheek to the other, by Metastasis: and others where after all attempts to cure have failed; being left to themselves, after a long time spontaneously subsided. Dr. Parry considers as the proximate cause a Chronic Inflammation,* and thickening of the neurilemma. Increased action of the blood vessels of the head, inflammation of the nerve with thickening of its coats are confirmed to be among its causes by Martinet, who has mentioned cases, where the nerve was of a violet colour, and studded with Ecchymoses. From close investigation, inflammation of the nerves has seldom been observed; from the circumstance that it has generally been confounded with the symptoms to which it gives rise; this, no doubt depends on the difficulty of detecting its traces in the nerves on account of their whiteness, and the small size of their bloodvessels. Nevertheless, Pathological Anatomy has discovered that they have really been inflamed, also changed in structure from the inflammation which has by some been considered as one of the causes of this disease; but more likely a consequence of it.

By Pathological Anatomy alterations are sometimes found in nerves, which should undoubtedly be regarded as the consequence of antecedent inflammation. These may be serous infiltration of their cellular sheath, adhesion to the neighbouring parts; abscesses in the course of a painful nerve—softening, and purulent disorganizations, enlargement in the vicinity of diseased joints; circumscribed tumors, cartilaginous, osseous and calcareous transformations.

Inflamed nerves have been observed on dissection to be reddened, tumified and infiltrated with gelatinous fluid; their vessels being injected, and exhibiting a kind of varicose dilatation. As to the symptoms of

* Parry's Elements of Pathology.

acute Neuritis, they have probably been confounded under the names of convulsions and pains, cramps, emaciation, palsy. However, as stated by M. Becard, the pain of acute Neuritis is accompanied with fever, at least local. When this disease becomes Chronic the symptoms are those of Neuralgia, which is a Chronic Inflammation of the nerves, dependant on some particular organic lesion.

DIAGNOSIS.

There are three diseases with which Neuralgia is likely to be, and has been, mistaken or confounded; and from which, by attending to the symptoms, it can easily be distinguished, viz.—Odontalgia, Rheumatism of the jaw and face, and Hemi-Crania. The age of the patient, condition of the teeth, and direction, nature, course of the pain and in particular the convulsive twitchings will guide us in our diagnosis: although, as before mentioned, young persons have been affected with Neuralgia, still it is more inclined to fasten itself on the nerves of the aged.

If there be any carious teeth as from the irritation they may cause, may operate to a certain extent on the disease, their extraction being premised, a decided opinion may be formed. In Odontalgia, the pain is obtuse or of a dull aching kind, being generally confined to one tooth, though sometimes a tooth in both jaws may be aching, or two in the same jaw, &c. then under these circumstances the pain will be more diffused; and often when produced by carious teeth in the upper jaw the pain extends through the cheeks to the eye, the gums and cheeks become greatly tumified.

The absence of swelling, shortness of paroxysms, quickness of their succession, the presence also of convulsions of the muscles, the darting lancinating pain along the course of the affected nerves in Neuralgia, render its diagnosis comparatively easy.

From rheumatism the diagnosis of this disease is more difficult. Both may produce convulsive motion of the mouth and cheeks; paroxysms attend both,

which may become accumulated in frequency for some space of time, leaving an interval of rest; both may be excited by slight causes, both also may be controlled by the same remedies.

We shall now look for the diagnostic signs. In rheumatism, the warmth of the bed heightens its acuteness; Neuralgia is little affected in degree of violence by that circumstance; the rheumatic diathesis is usually aggravated by a change from a dry clear atmosphere to damp and rainy weather, while the former though sensibly affected does not obey any such law of exacerbation or diminution. Acute rheumatism is accompanied with fever, redness, heat and swelling. Chronic rheumatism is attended with an obtuse or dull aching pain, long continued and often increased, at night. The symptoms of Tic Douloureux are the very contrary.

From Hemi Crania it may easily be distinguished by the periodical nature of that disease, as also from its being confined to either, or extending to both sides of the scalp or face, not along the course of the affected nerve as in Tic Douloureux, from the absence of convulsive twitchings; also its occurrence at a regular hour of the day, generally at noon.

TREATMENT.

For the cure of this affection a crowd of dietetic, pharmaceutical and chirurgical remedies have been employed. A few in some cases have cured, while in others they have only palliated, or have produced no benefit, while many have been employed without any advantage or relief whatever.

Among the narcotics, Opium, Cicuta, Datura, Stramonium, Conium, Maculatum, Atropa Bella donna and Hyosciamus have been found very effectual in relieving; and some cases are recorded that have been cured by them. The Cicuta seems to have been the most effectual among that class.

Dr. Jackson's remarks and experience with this

remedy are very useful, and his boldness in its exhibition is an evidence of the advantage and harmlessness with which a watchful physician may administer the most dangerous medicines. He is of opinion that Dr. Fothergill, with whom this medicine was specific, could not be mistaken with regard to its operation. The imported extractum conii maculati is generally very inert, therefore, the physician should be well satisfied as to the good quality of the article before prescribing it. The cautions given by Dr. Fothergill for the preparation of this extract are that the plant should have acquired its full vigor and be rather on the decline: just when the flowers fade the rudiments of the buds become observable and the habit of the plant yellow. It has then had the benefit of the summer heat, and the plants which grow in exposed places will generally be found more virose than those which grow in the shade. The less heat it undergoes during the preparation the better. It may be most prudent when prescribing it to begin with grs II of the extract, but we may give grs. V in the second dose, X in the third and so on till an effect is produced in the system. When given in a full dose it occasions slight nausea and giddiness more or less severe, and often loss of muscular power so that the patient can not stand. It seldom does good unless followed up in such a manner as to produce some of its effects on the general system. The dose may be repeated every two hours, though some practitioners have in very severe cases ventured every half hour, the patient and attendants to be careful and watchful as also well instructed with regard to its effects.

Dr. Fothergill seldom went beyond grs. LXX. in the course of twenty-four hours. Dr. Jones ventured to give grs. C. Dr. Jackson* grs. CCC. in six hours. This gentleman states, that he conceived, that if the system could be made to feel the effects of this medicine suddenly and powerfully, there

*Jackson on Tic Doloureux, New-England Journal.

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would be a chance of effecting a real cure, a better chance than from giving a larger quantity during a long space of time. Accordingly after having exhibited the medicine for about a fortnight and increased the dose to six and eight pills of grs. v each, and having ascertained that whenever any remarkable effect was produced it took place within fifteen or twenty minutes after the dose was swallowed, resolved on a bold trial of this medicine accordingly, and directed eight pills to be taken as soon as the pain should come on and the same to be repeated every twenty-five or thirty minutes, if the pain should continue and the medicine not affect the head or stomach. At this time the paroxysms of pain had become inexpressibly severe and very frequent. His directions had been carefully followed. The intervals of pain were such as to prolong the intervals between the doses; but in the course of six hours sixty pills were taken, making three hundred grains. After the last dose the patient was quite overcome by the medicine. She became dizzy and faint, and was unable to sit up.—She laid upon the sofa for some time in a state of intoxication, but without suffering any very unpleasant effects; afterwards the respite from pain and from susceptibility of pain was more perfect and longer than at any time for weeks before, but the disease was not conquered, it returned the next day with considerable violence. Directions were given to repeat the medicine should the pain return, which was done, and in the course of the day forty eight pills, equal to two hundred and forty grains were swallowed. These gave entire relief and affected the head, though not so powerfully as the day before. The disease seemed now to be vanquished, and for two months the pain was not felt except in very transient twitches, which never continued for any length of time. About two months afterwards this lady walked out on an extremely cold day and the disease returned before night with considerable violence. The hemlock was employed

again, but in smaller doses at first. In three days the disease gave way, without having required very large doses of this medicine; since that time it has never returned, which is more than three years.

The tincture of Hemlock prepared in the same proportion as the *tinctura digitalis purpureæ* has been found equally efficacious. In Dr. Jackson's* practice, in an other case of Neuralgia he began, with thirty drops at a dose to be frequently repeated, and presently increased if relief be not obtained; the dose was gradually increased to three hundred drops. It never gave relief till the head was affected, and after that occurrence took place, the disease yielded in three weeks after he commenced the use of the hemlock, and since that time has not returned. The action of narcotics on the system by repetition, is diminished more than that of any other class of medicines. Each seems to have a *modus operandi* peculiar to itself, and frequently after the failure of one the administration of another will produce the desired effect, which shows that the operation of the same medicine in the same disease, is not followed by similar effects, from the circumstance of their action becoming weakened by continued use. Doses have been given after a few days, and in some cases after a few hours, as in that of *Cicuta*, which, if administered at the commencement, would have produced death. The peculiar habit must be consulted. The narcotic, in treating this disease, must be changed till the one be found which produces stupor on the nerves, and then in time the disease may be cured. *Datura Stramonium* has also been employed, but I believe with more efficacy in other forms of nervous disease than in this complaint. Dr. Marcet mentions that doses from one eighth to half a gr. three times a day, have obliterated this disease. *Atropa Bella-donna* has occasionally been found of advantage. Cases are mentioned

*New-England Journal. Jackson on Tic-Doloureux.

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where the extract in quarter grain doses three times a day, gradually increased to half a grain, have been administered. The pain recurred now and then, but on resuming the medicine ultimately went off. It has succeeded when opium and division of the nerve failed. Opium has been used in some cases with success, in others with no benefit whatever. One case is recorded by Dr. Duncan, where it was followed by the desired effect. Dr. Gregory considers Opium as the only effectual means we have. Mr. Thompson, of Whitehaven, published two cases where this medicine succeeded in doses from grs. II. to IIIss. The alcohol ammoniatum is reported as having been efficacious in removing this disease. It has been given in doses of thirty-five drops; increasing a drop every dose, with success. Prussic Acid has been recommended by Mr. Taylor, who states that he succeeded in a shorter time than where he used the Carb-Ferri. The greatest care is to be taken in its administration. Its odour produces fainting, and a drop externally will produce death. He commenced with the sixteenth of a drop, gradually increasing. When these dangerous medicines are changed, the original dose must always be resumed.

Arsenious acid in pills, containing a sixth of a grain with soap, is reported to have cured a case caused by an injury of the Os-Frontis. This medicine will be found of more use when combined with a substance capable of diminishing the force of the circulation, and consequently of blunting its stimulating effects, in which case it has been found to act more directly on the nervous energy. With such a view it may be combined with Digitalis. Mercury pushed to salivation has in some cases been found successful. Quinine. This tonic has been recommended by many. Cases are recorded as having been cured, by this medicine, in three grain doses. Mr. Dupré published many observations representing Sulph. Quinine as a very powerful remedy in Neuralgia, as well as other affections of the nerves.

Dr. Rabey having met with great success, from the exhibition of this medicine in Neuralgia, has published some cases in Magendie's *Journal de Physiologie*, April 1832. From sixteen to twenty grains may be administered during twenty-four hours. Carb Ferri has proved very efficacious in this disease.

In one case of Neuralgia of the extremities reported by Dr. Elliotson of which we shall take a concise notice. The patient was a female, 33 years of age, who had suffered for three months from violent pains in her leg, commencing in her great toe, running along the inside of the tibia to the ham, the groin and along the lower part of the abdomen to the loins. It came on rapidly, excited by the slightest circumstance, was of a snooting stabbing kind; she was ordered $\mathfrak{ss}$ Carb. Ferri every six hours, in five days the pain was relieved, and the medicine was continued for a fortnight longer, when the improvement not being progressive she was ordered $\mathfrak{ss}$ three times a day; three weeks subsequently she was reported quite well.

When this disease is accompanied with rheumatic diathesis, the Tinct. Guaiac : Volat : will be found serviceable in doses of a teaspoonful every two hours in a little wine. And when produced by a derangement of the digestive function, Emetics and Cathartics may be administered and followed by Carb. Ferri, if the latter should fail, the extract of Cicuta may be administered. Sir A. Cooper applied an ointment of the sugar of lead to the face of a man, the pain by degrees abated, followed by a complete cure, a short time afterwards. In the hospital Charité (France) an ointment of the following form is used. Neuralgia Ointment. R. Lard dr. II, Opium dr. I, Ceruse $\mathfrak{ss}$. Local irritants have been followed by great relief, and not unfrequently by a perfect cure. M. Andral cured a case by applying an issue directly over the seat of pain. In the course of the infra orbital nerve, blisters and leeches have been found serviceable, fomentations and frictions with mercurial ointment have

also been applied. Electricity has been tried in some cases with wonderful effect.

SURGICAL TREATMENT.

The history of the operation by surgical treatment is coeval with the first description of the disease. In an instance related by Sauvages, the celebrated Surgeon Mareschal divided the nerve, and the patient whose sufferings had been excessive, and who had not slept for many nights, enjoyed sweet repose the night after the operation; but within a few days the disease "returned." Tandem post biennium Andraas ope lapidis caustici ad nasi latus inusti aquæ mercurialis supra escharam affusæ, incisionis ad os productæ post duodecim dies quibus hæ operationes institutæ sunt statim am sublevit quæ denique omnino sanata fuit cum chirurgus initio denudatum stylo attingebat paroxysmum trismi pro lubitu excitabat cicatrice abducta ægra sana vixit. André employed caustic as his great curative indication, and his practice prevails in France at the present period. In an aggravated case of Dr. Haighton's, reasoning on the apparent pathology of the disease, he was convinced that a division of the nerve would be effectual. Nor was he deceived. The testimony of many surgeons is united in this point. Dr. Haighton* besides his experience quotes from Sabatier's anatomical treatise. One instance from De. Haens' *Ratio Medendi*, another by Mr. Ritch, a Polish surgeon of high respectability, and a third in Paris in which the success was only temporary. M. Louis performed this operation with success on a Prior of Premontres.† In addition to Dr. Haighton's authority, many excellent surgeons admit, that where the nerves are effectually divided, a perfect suspension from misery will be obtained, at least until the reunion of the nerves be affected, and as that commonly takes

*Med. Records and Researches.

† Gazette Salulaire, No. 36, 1776.

place in a short time after a simple division of the nerves under certain circumstances.

I shall take into consideration under this, the surgical treatment of the disease ; those circumstances by which a re-union of the nerves is prevented, and also those by which if not prevented it will be delayed and in some cases destroyed altogether. As some surgeons operate in such a manner as to produce each of the foregoing effects, we shall now treat of divided nerves.

In traumatic inflammation the two ends of the nerve, especially the superior, swell & become vascular; the surrounding cellular texture also inflames & becomes compact. The swelling and redness of the nerve extend in the end above the wound, but not in that below it : the small space between them is filled with the investing cellular texture which contracts intimate adhesions with them ; ultimately, the inflammatory redness dissipates; the enlargement of the nerve remains, and the cicatrix unites the two thickened extremities. When there is much loss of substance the ends of the divided nerve continue separated in proportion to the absence of structure; when the loss of substance is inconsiderable, the two extremities become united by a cicatrix less thick than themselves, its thickness in general is proportionable, to the loss of substance ; when this is considerable the separated ends of the nerve grow rounded. When a nerve is divided, an oozing of organizable matter takes place, for some days, around its ends, on its surface, and in the intervening space ; the surrounding cellular tissue is penetrated by this matter and loses its permeability ; in this state the ends of the nerve are simply agglutinated together, and to the adjacent parts ; and its functions, are still suspended as they were immediately after its division. Forthwith the two ends of the nerve, which are thickened, the investing cellular texture, and the organizable matter, acquire greater consistence and become very vascular ; in this state, which continues some time,

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the two ends of the nerve are united, by a vascular organized substance, but still there is not yet a communication of nervous action between them.— In due time the cellular tissue ceases to be compact and vascular; the intermediate substance gradually diminishes in size consistence, and redness; acquires the appearance and texture of a nerve and ultimately discharges its functions. This end is attained sooner and more perfectly when the nerve has been simply divided or the excised piece small, and in a part not much subjected to motion. On the other hand when the separation has been important, re-union is never attained; it rather takes place through the cellular texture, which does not acquire, at a certain distance from each end, the nervous structure and qualities.

The time necessary to a complete recovery of the structure and functions of a nerve has not been precisely ascertained. Some writers who scribe the fancies of their imagination, say several years. Dupuytren, Beclard, Dupuy and Roux from six to eight weeks, which I have frequently witnessed, and which must recur to every surgeon.

From the results of many experiments which my space will not allow me to include, as also from the termination of accidental division of nerves in the restoration of their proper functions, which I am satisfied cannot be performed by any other tissue, but nervous, neither by the interposition of a substance simply humid between the divided ends of a nerve, nor by the remote action of the nervous system, nor by the anastomosings of nerves which, if capable of re-establishing their functions, would constantly produce restoration in the case of a nerve completely divided with a part extirpated; or where no extirpation has been resorted to, but merely complete division effected in a part subjected to much motion, as in the vicinity of a joint, occasioning, besides the primary, an accidental and variable separation, where reunion if it ever succeeds is tedious and imperfect; as also when there is a considerable destruction of the ner-

vous trunk by excision a great separation of its two ends remains, and its functions are forever lost. This fact is sufficient to prove that the nervous anastomoses do nothing towards the re-establishment of their functions.

The operation of dividing the nerve and extirpating a piece of it, is the certain method of producing a radical cure. From the circumstance related, where a considerable portion of the trunk of a nerve is destroyed, a great separation of its divided ends remain with the perpetual loss of function and consequently a complete barrier to the return of the complaint. M. Abernethy, however, arguing from the renewed sensibility & mobility of the ring finger on which he operated, thought that the anastomosing branches had become enlarged, and were officiating in lieu of the original trunk, by which means a complete cure was rendered impracticable. Had that learned surgeon removed a portion of the Ulnar nerve & then been baffled in his anticipated cure, his apprehension would have been well founded. There is some difference between the effects of a divided trunk and its branches. Nervous influence can readily be re-communicated by the preservation of the former, should the latter be effectually operated on. Moreover, as the nerve of the opposite side of the finger was derived from the radial nerve, the difficulty of solving the mystery is diminished.—To attempt a removal of a considerable portion of the frontal, infra-orbital or mental nerves, would be useless; because the ramifications are so immediate and extensive as to preclude a successful endeavour. The branches of the *Pes Anserinus* are intimately connected with the Parotid gland and duct, also by some beautiful anastomoses with the other nerves of the face, so that a similar hindrance occurs here. The nerve that affords the greatest chance for effectual and final division is the *Portio Dura* between the stylo mastoid foramen and angle of the lower jaw.

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tem, if half an inch of the principal trunk, supplying the affected part, could be removed, there would be little dread of its return. A repetition of incisions, through a nerve by insulating several portions with a view of protracting a renewal of the disease, was practiced by Dr. Mott, of New-York, when operating on Dr. Jones (the sub. orbital was the nerve operated on:) it may be remarked, as a circumstance connected with the operation, that although the nerve be completely divided, whether part of it be insulated or not, the chain of morbid actions will not be interrupted for several, perhaps twelve or fourteen days, even when the disease is comparatively slight. After the operation the paroxysms have occurred, but day after day diminished in frequency and became less painful till they disappeared altogether. Dr. Parry says that the operation of dividing the nerve, as performed by Dr. Haighton and others, did good rather by the division of the arterial branch supplying the affected divisions of the ramifications of the trigeminus nerve, than by the division of the ramification itself. He employs bleeding, both general and local, with purgatives. He also employed Opium and Calomel in one case which did not yield easily. He mentions that he succeeded particularly by local bleeding. Dr. Mitchell also states that he has cured these pains by tying the branch of the temporal artery, which goes to the parts in which they are seated.

Delpach affirms that the pains are frequently the consequence of a Ganglion and thickening of the neurilemma, and in such case, excision of the part is then indispensable.

OPERATION ON THE INFRA-ORBITAL NERVE.

The participation of this nerve in Neuralgia may be detected by the course of the pain up the side of the nose, along the hollow of the orbit, and affecting

the muscles and integuments of the lower eyelid and corresponding side of the cheek. The pain extends along the forepart of the upper jaw and along the canine and incisor teeth, or it may be confined to the muscles passing between the os-malæ and the angle of the mouth, involving the masseter and buccinator. Pressure may be applied to the infra-orbital foramen, during which, the pain will be arrested, provided the disease depends on that nerve. A tremulous motion of the muscles of the upper lip and convulsive twitchings on one side, attend this variety. The infra orbital foramen is, in most skulls, half an inch from the lower edge of the orbit, and can be ascertained by the depression which is distinguishable in most persons. Before operating let the nose be held aside by an assistant, who also secures the patient's head. Introduce the Bistoury about mid-way between the nose and nasal margin of the foramen, carry it down to the bone, and pass the point close to the bone, in order to get it under the nerve. The point must then be elevated a little, tho' it must not pass through the skin from beneath. By a little rubbing motion with one finger upon the point of the knife, at the same time cutting gently with the knife, the nerve will be divided.

As a considerable branch of the internal maxillary artery accompanies the infra-orbital nerve, its division will be made evident by a copious arterial hæmorrhage; and a peculiar acute pain accompanies the division of the nerve, in addition to the difference perceptible to the operator between cutting a nerve and any other soft solid; the upper lip must now be examined by a touch, if the patient acknowledge a destruction of sensibility, the Surgeon may withdraw his bistoury, otherwise the cutting must be repeated until from numbness, he is satisfied that the nerve is divided; but by following the directions above directed, and in a proper manner, he will find that a repetition of the cutting will not be requisite; being certain that the nerve is thoroughly divided at the point of section, make two or three incisions through it, lower down,

endeavour to insulate a portion (included as it were within a parenthesis) with respect to the common sensorium.

Sir A. Cooper recommends (when the infra-orbital nerve is to be divided) the operation to be performed a quarter of an inch below the orbit.

OPERATION ON THE FRONTAL NERVE.

This final distribution of a highly useful and important branch of the Trigemini after it has entered the orbit through the foramen lacerum, and between the periosteum and bone, according to Meckel; but in reality between the periosteum (to which it appears to cling) and superior rectus muscle of the eye, along with, but outside, and rather below the Trochleator, and within a few lines of the superciliary arch, divides into two branches; the supra trochleator and proper frontal, which last passes through the superciliary notch or foramen, ascends on the forehead, subdivides and is lost in the muscles, and integuments of the scalp, and inosculation; the supra orbital foramen, in many skulls is only a notch closed below by a ligament; the situation of this hole or notch may be ascertained with tolerable precision, by finding the sub-orbital foramen; as it is about a quarter of an inch within a perpendicular line down from the latter continued up the forehead.

Pass a bistoury about three fourths of an inch within the orbit, immediately beneath the superficial ridge of the os-frontis, and divide the nerve outwards; a numbness must be felt on the forehead and eyebrow, before the knife is withdrawn; the connection between the nerve and periosteum is sufficient to impress the necessity of keeping the point of the bistoury as close as possible to the bone; and the dense periosteum affords additional resistance; while dividing the nerve, the ophthalmic artery will afford hæmorrhage for a few minutes, but soon contracts so as to completely shut its mouth, and when its flow outwardly is repressed, it will produce so much ecchymosis as to blacken the eye to a considerable extent.

OPERATION ON THE MENTAL NERVE.

The foramen through which the termination of the inferior maxillary branch of the fifth emerges, is situated about mid-way between the alveolar process of the jaw, and its base in a line between the cuspidatus and anterior bicuspid tooth; the nerve may be divided by turning down the lip and introducing the bistoury about the first bicuspid tooth, with the back towards the angle of the jaw; keeping the knife close to the bone, and by following the excavation of the jaw, the nerve will be divided by a cutting motion rather from the bone.

In the aged edentulous subject from the absorption of the alveolar processes in reference, can be made to the teeth, in finding the mental foramen, it is situated generally in the same line with the supra-orbitary foramen, and consequently can be easily discovered.

OPERATION ON THE PORTIO DURA.

The trunk of this nerve can be reached with safety, only by an incision, beginning at the very root of the mastoid process, and continued downward and forward along the anterior margin of the Sterno Mastoid; the dissection no doubt will require to be deep, but in performing it the surgeon will experience little difficulty; the lobe of the ear must be held upwards and forwards while prosecuting the dissection. In performing which, the nervus superficialis colli will be divided where entering the lower angle of the parotid. The glandular substance itself will be injured, and the arteria posterior auris cut across.

A few observations on the propriety of employing caustic applications will close the subject. If the object be to destroy every prospect of a recurrence of Neuralgia; and if the patient will consent to an experiment, which if successful, must eventually annihilate the nerve; the precedents afforded by the French Surgeons will authorise the attempt. It has been objected that the proximity of some of the nerves to the

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bone, must necessarily involve exfoliation; this consequence depends very probably on the management of the caustic, which should not be kept so long in contact with the bone as to endanger its continuity.

After a nerve has been divided by an operation, I would advise the operator to separate the edges of the wound by means of a pair of forceps carried down to the nerve, holding the sides firmly between the forefinger and thumb to prevent unnecessary dilatation, merely sufficient to expose the edges of the divided nerve in such a manner as to render it possible of applying the edge of a piece of caustic, pared like a drawing pencil, to the extremity of the nerve, thus combining both expedients.

The most permanent cure from this disease, has been derived by cauterization; it is in the true sense of the word, the radical cure; and from the circumstance of simple divided nerves uniting, and the disease returning after the operation with the same violence, the French Surgeons have entirely adopted the use.

Many cases might be transcribed in support of cauterization; the French journals teem with the wonders resulting from its employment as a remedy for painful nervous affections, whether produced by the action of concentrated caloric or of any caustic substance, producing an eschar; the separation of which is equal to a wound with loss of substance. Nerves are rarely, if ever, the exclusive subjects of burning or cauterization; the nearest manner possible of confining the effects of caloric in the nerve, will be described presently, and when in this mode; the adjacent parts will be more or less affected, for the caloric is given off by the side of the needle, nearly, if not as much as at the point itself, though the eschar consequently will be very small when injured, in this way nearly by themselves, or simultaneously with other parts, they are converted into an eschar, or the detachment of which, there remains between their ends a space proportionate to the extent of structure destroyed, and the cicatrix that closes the wound, does not restore the continuity of the nerves or its functions.

For this reason cauterization is usually preferred in cases of Neuralgia, and most frequently determines favourable results, while simple incision is too often followed by a relapse; experiments on the lower animals prove that superficial cauterization does not destroy the functions of the nerve, and most professional men who have seen and employed the moxa in such a manner as to produce rather a deep eschar, so that the nerve was not directly acted on, or in any manner destroyed, its function returned; but after complete cauterization the nerves' functions are never restored.

Dr. Descot gives the history of two experiments with the cautery, on a dog, in the one superficial, in the other complete cauterization was employed, with an account of the appearance of the nerve in the latter, on the twelfth day after it had been injured. The animal walked on three feet, the palsy of the other being complete; the trunk of the nerve was completely divided across, and a space of more than an inch existed between the two ends; the upper was slightly thickened and flattened—the lower end exhibited no traces of having been cauterized, both of them adhered strongly to the surrounding parts to which they were intimately blended. Additionally to these, he relates a case of Maxillo-dental Neuralgia, cured by the actual cautery; the patient, a Lady of fifty years enjoyed the "*best of health*" afterwards.

Richerand, Delpech, and most of the leading Surgeons in France, express their preference to the application of the moxa or cautery, which they say proves more frequently successful than the knife, this should be applied directly over the apertures, from which the nerves emerge, on the forehead, cheek or chin. Richerand states that in all the cases he attended, success followed the use of the moxa or cautery; these two last remedies have been found extremely beneficial in painful, nervous affections, particularly the moxa; after the application of which in painful affections of the most excruciating nature, complete relief followed; it should be applied over the point where the greatest distress exists, or when the greatest pain is

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not confined to one point, as in some nervous diseases, but extends along the course of the nerves; it is to be applied as directed above.

The application of caloric to the body is followed by a contraction of the capillaries, and "an increase in the rapidity of their circulation;" this contraction does not proceed from mere physical action, but is the result of the influence of heat on the vital properties of the vessels, and the effects of caloric are not limited to the point to which it is directly applied, but can excite an action in living structures, to a considerable extent; for, it acts on the capillaries as a local tonic or stimulating astringent, and the power which this class of remedies possesses of extending their influence by sympathy, along continuous surfaces or similar textures, is well known. The direct effects of the moxa are seldom, if ever, confined to the skin; if an eschar be formed, it extends to the superficial fascia, and subcutaneous cellular tissue; and if the moxa be applied through the medium of a needle, the caloric may be made to propagate its influence to any depth.

The moxa may be formed either by immersing Surgeon's lint or fine linen in a filtered solution of Chlorate of Potass, in the proportion of one drachm to four ounces of distilled water. This burns slowly but steadily, even the blowpipe produces no sparks; the substance must be perfectly dry, when folded should possess a proper degree of firmness, and after rolled up, the end ought to be cut to make it level for application; the length of the moxa should be from three quarters of an inch to one inch, and the diameter may vary from one quarter to one inch; the common mode of applying the moxa is so well known that it would be wasting time and place in describing it.

When the moxa and acupuncture needle are used together, perforate a moxa of a proper size by a needle of such a length as will be sufficient to reach the seat of the disease, and at the same time extend so far beyond the surface of the skin as to keep the moxa about an inch from it, or so far as to secure the texture of the skin from injury. The needle is then in-

troduced as far as the seat of the disease, by the assistance of a *porte-aiguille*, and as soon as it has been introduced the *port-aiguille* is then removed, the needle being left in the part. The moxa which had been previously perforated, should be now placed in a state of combustion, on that end of the needle which projects beyond the surface of the skin, and allowed to burn round the needle by which it is thus transfixed.

The heat disengaged from the moxa is communicated to the needle, and thence conveyed to the seat of disease. When the needle has cooled it is removed, and the wound or eschar produced by it is scarcely observable; and it is only from the universal success following this operation, that it so long has been and still continues preferable among the French Surgeons, together with the cautery, to division of the nerves, performed by the English Surgeons.

Immediately after the operation of the moxa, applied so as to produce a large slough, it is advisable to wet the skin with *aqua ammonia*, but when applied with the needle as before described, no after treatment is necessary; when eschars exist they should be covered with adhesive plaister until they separate, which may be expected in eight, ten and occasionally twenty days afterwards. The Moxa acts more favorably when the eschar is thrown off very slowly. Superficial ulcers, and excoriations may be washed once or twice a day with a solution of nitrate of silver, or sulphate of copper, and covered by adhesive plaister.

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